PART IV

ARIZONA WILLOW CONSERVATION STRATEGIES BY MANAGEMENT AGENCY

C. Dixie and Fishlake National Forests and Cedar Breaks National Monument

ARIZONA WILLOW CONSERVATION STRATEGY
DIXIE AND FISHLAKE NATIONAL FORESTS
AND
CEDAR BREAKS NATIONAL MONUMENT

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I. INTRODUCTION

Populations of Arizona willow discovered in Utah during the 1994 field season add significant "new" data on the species distribution and status. Inventories of potential habitat in Utah over the next several years will add additional information. The species and its habitat in Arizona are currently on a strong downward trend while many of the Utah populations appear to be stable. A more detailed review of the species' ecology and relationships in riparian communities is currently underway for populations on both the Dixie and Fishlake National Forests (NF).

These unique riparian areas have received heavy recreation and range uses and have faced significant conservation problems in the absence of conservation planning. Arizona willow habitats are associated with or are adjacent to old growth spruce/fir forests and are being impacted by timber harvesting and encroachment of trees into riparian areas. Limited research on the species makes its habitat vulnerable to current management programs. Current forest management practices in some areas in Utah (East Fork of the Sevier River, CCC Camp, and Seven Mile drainage) are not compatible with maintenance of quality habitats. Furthermore, the population biology and management of the species requires across-region and interagency planning to facilitate effective conservation planning and management.

The Utah populations of Arizona willow (*Salix arizonica* Dorn) occur on both volcanic and sedimentary soils and are in dense clones or stands in some populations. For the most part they appear to be more healthy than the Arizona populations. Management of the genetic diversity in these disjunct populations of Utah and Arizona will be an important component of the conservation strategy for the species. While our understanding of this willow's ecology, biology, and management needs are insufficient to produce a conclusive assessment and strategy, this document provides our best effort based on the available data.

The success of this effort goes beyond the conservation of the Arizona willow. This strategy and its implementation is "breaking New Ground" in our cooperation to conserve species. This effort will serve as a "blueprint" for conservation of other species and ecosystems. It also serves as a major accomplishment implementing the intent of the recently signed National prelisting Memorandum of Understanding for species conservation.

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II. CONSERVATION STRATEGY

A. Goals

The primary goal of this document is to provide direction that will lead to long-term management and protection of Arizona willow and its associated ecosystems while minimizing conflict with other resource values and land management activities. Implementation of specific actions to remove threats will ensure that activities on public lands will not contribute to the loss of essential habitat or species viability.

To achieve the above goals, the following site specific objectives have been identified. If these objectives are met, management of Arizona willow and its population will meet the stated goals.

1. Determine the life history and biological needs to maintain or improve population viability of Arizona willow.

2. Complete surveys within high priority potential habitat in Utah within the next 2-3 years.

3. Manage and/or restore Arizona willow riparian ecosystems to achieve a healthy balance of ecological stages.

4. Implement specific actions to remove threats to ensure species viability throughout its range.

5. Monitor unique populations to determine current trends and the effectiveness of management strategies in maintaining or improving species viability of the species.

6. Revise land management plans and incorporate the conservation strategy into Land and Resource Management Plans to ensure that budgets are programmed to provide for implementation.

B. Objectives

1. Determine the life history and biological needs to maintain or improve population viability of Arizona willow.

There are several aspects of the life history and biological needs of Arizona willow that need to be studied. These include seed set, viability and longevity, genetic variability within and between populations and pollinator biology, and density. In addition, several populations should be protected from grazing using exclosures to study demographics and plant longevity.

2. **Complete surveys within potential habitat in Utah over the next 2-3 years.**

   Surveys of potential habitat should be completed throughout Utah within the next 2-3 years.

3. **Manage and/or restore Arizona willow riparian ecosystems to achieve a healthy balance of ecological stages.**

   This will involve a variety of management strategies which may include: livestock grazing, wildlife grazing, recreation management, bank stabilization, and vegetative plantings.

   Heavy grazing by domestic livestock can change species composition, break down stable banks and lower water tables, all of which negatively impact Arizona willow habitat.

4. **Implement specific actions to remove threats to ensure species viability throughout its range.**

   See tables in Parts I and III.

5. **Monitor unique populations to determine current trends and the effectiveness of management strategies in maintaining or improving viability of the species.**

   A monitoring plan has been prepared in conjunction with this conservation strategy. This plan has been reviewed by experts from U.S. Forest Service, U.S. Fish and Wildlife Service, and universities. When fully implemented, this plan will enable the Forest Service to closely follow population trends and the effectiveness of management on Arizona willow. The monitoring plan is included in appendix x.

6. **Revise land management plans and incorporate the conservation strategies into Land and Resource Management Plans (LRMP) to ensure that budgets are programmed to provide for implementation.**

   Dixie National Forest LRMP - The Forest Plan will be amended to include the conservation strategy for Arizona willow in fiscal year 1996 if needed. It is anticipated that the Forest Plan revision will be completed by ecoregion subsection. At that time, the conservation strategy for the Arizona willow will be included in the Plan revision for the Dixie Subsection. The conservation strategy will also be included in the Plan revision for any other subsection on the Forest where Arizona willow may have be discovered as a result of ongoing inventories.

Fishlake National Forest LRMP - The Forest Plan will be amended to include the conservation strategy for the Arizona willow in Fiscal Year 1996 if needed. It is anticipated that the Forest Plan revision will be completed by ecoregion subsection. At that time, the conservation strategy for the Arizona willow will be included in the Plan revision for the Fishlake Plateau Subsection. The conservation strategy will also be included in the Plan revision for any other subsection on the Forest where Arizona willow may have been discovered as a result of ongoing inventories.

III. BIOLOGICAL AND GEOGRAPHICAL INFORMATION

A. Nomenclature and Description

Arizona willow (*Salix arizonica*) belongs to the family Salicaceae. The species was described by Dr. Robert Dorn in 1975 from Arizona specimens collected by Carl-Eric Granfelt in 1969. The species, in Utah, is generally a shrub up to 4 feet tall in course well drained soils and a much shorter prostrate shrub in the wet, less drained sites. Several forms are manifest based on soils, moisture and grazing impacts. The branches are yellow-green, red-brown, or brownish, villous to pilose, with the previous years growth usually red. The leaves are short-petiolate (3-7.5 mm) with gland-tipped serrate margins (7-21 teeth or glands per cm). The mature blades are elliptic to broadly elliptic, 20-50 x 10-31 mm, 1.6-3.6 times as long as wide with the lower surface non-glaucous, glabrous or pilose, upper leaf surface shiny, pilose or glabrous with a cordate or rounded base; young leaves of the current year's growth are often much larger but still maintain the length x width ratio. The inflorescence is coetaneous with brown, black or bicolor floral bracts 1-2 mm long, with wavy hairs and acute tip. Pistillate (female) catkins are densely flowered, 1-4.5 cm long with glabrous ovaries.

The species occupies wet meadows, stream banks and seep areas between 8,360-10,800 feet elevation on sites with less than 9 percent (%) slope. Flowering occurs primarily from June-July.

B. Status

The current and proposed status is summarized as follows:

FWS: Proposed for listing as Endangered (57 FR 54747)

USFS: Designated as a sensitive species in Region 3 by the Regional Forester. Currently being added to the Region 4 Regional Forester Sensitive Species List.

STATE/Heritage Databases: Utah: S2 G2

C. Geographical Distribution and Population Information

1. Geographical Distribution

Until recently Arizona willow had only been known to occur in the White Mountains of Arizona on the Apache-Sitgreaves NFs the Fort Apache Indian Reservation. In the Arizona populations, all Arizona willow plants have been found in drainages that trend to the north, east, or south. Sometimes, individuals are widely spread (more than one mile apart), but occasionally, plants are clustered. The species is found at elevations above 8,500 feet in wet meadows, stream sides, and open meadows and most commonly in or adjacent to forest edges or meadows with sparse stands of spruce. Plants are also found in drier sites within the riparian zone.

On June 30, 1994, Arizona willow was rediscovered on the Dixie NF in southern Utah (US Forest Service, Intermountain Region, R-4). A population was originally collected in 1913 on the Sevier National Forest (which has been renamed, and is now known as the Dixie NF). The 1913 collection was identified as Black Willow (*Salix pseudomyrsinites* Andes). Nineteen additional populations have been discovered, including one located on August 8, 1994, on the Loa Ranger District of the Fishlake NF.

Based upon three months of field survey data on the Dixie NF, the range of Arizona willow is known within two areas. The first, is 17 populations on the Markagunt Plateau in the vicinity of Brian Head peak. These populations are disjunct in an area approximately 15 air miles across. The second, very small population, located on the Paunsagunt Plateau in the East Fork of the Sevier River drainage. Elevations range from 8,360 to 10,800 feet. Populations were located in wet meadows, along stream sides, and in open meadows. Most commonly, populations were located adjacent to perennial water and in meadows adjacent to forest edges composed of spruce. Plants are also located in drier sites along forested edges. Populations tend to occur in large, dense patches, sometimes occupying several hundred acres. In many areas, Arizona willow is the dominant shrub component. Individuals widely spaced throughout a drainage are rarely found. Plants have been found occupying all aspects, but they primarily trend east, north, or south.

Based on one week of field surveys on the Fishlake NF, the range of Arizona willow is limited to the Seven Mile Creek drainage. This population has been surveyed for approximately four miles along the stream and adjacent meadows and riparian stringers and occupies 151 acres. Arizona willow has been located the entire length of the area surveyed. This population is about six miles north of Fish Lake and lies approximately 105 air miles to the northeast of Brian Head Peak (Figure 5, page 66). Elevations range from 9,200 to

9,400 feet. Populations are located in wet meadows, along Seven Mile Creek, numerous springs and seeps, and in large open meadows. Most commonly, populations were located adjacent to perennial water and in open meadow areas. It was not uncommon to find populations adjacent to forested edges. Some plants were located in drier upland sites along forested edges. Populations tend to occur in large, dense patches, sometimes occupying up to 30 acres in size. Individuals were generally clustered, but occasionally occurred as single individuals spaced throughout a drainage mixed with various other willow species. Plants were found occupying all aspects; however, they primarily trend east, north, or south.

2. Population Information

Dixie National Forest

There are 19 locations of Arizona willow located on the Cedar City and Powell Ranger Districts of the Dixie NF. Additional field work, i.e. surveys, monitoring, research, etc. will continue through the year 2000. These actions are outlined in Parts I and III. Listed below are the names of each population and the number of acres identified.

		acres
1.	Brian Head Peak	1
2.	Brian Head Town	20
3.	Bunker Creek	1
4.	CCC Camp	42
5.	Castle Creek	6
6.	Cedar Breaks	21
7.	Crystal Spring	1
8.	East Fork Sevier	2
9.	East Power Line	37
10.	Hancock Peak	24
11.	Long Valley	4
12.	Lowder Creek	142
13.	Midway Face	3
14.	Navajo Lake	9
15.	Power Line	105
16.	Rainbow Meadows	304
17.	Reeds Valley	1
18.	Sheep Herder Camp	72
19.	Sidney Valley	79

Each location has been mapped using a Global Positioning System (GPS), and the exact size calculated in acres. Additional populations located will also be

recorded and entered into the Forest GIS data base. There are approximately 210 acres of Arizona willow that occur on private land, and the remaining 663 acres on Federal lands.

Fishlake National Forest

A large population of Arizona willow (130 acres Forest, 21 acres private) occurs in the Seven Mile Creek drainage on the Loa Ranger District. Because surveys have been limited, the extent of the population is unknown. However, surveys have been completed along four miles of stream and adjacent meadows and riparian stringers. Arizona willow occurs throughout the four mile area surveyed. Additional surveys will be completed in the Seven Mile drainage over the next several years and in other potential habitat areas on the forests along with other actions identified in Tables 1-5.

D. Habitat

Habitat protection is currently in place which will continue to offer protection for selected populations on both the Dixie and Fishlake NFs as scheduled in tables in Parts I and III.

IV. THREATS TO THE SPECIES

Listed below are threats which have been identified that could affect Arizona willow populations or their habitat.

A. Livestock Grazing

Livestock grazing poses great threat to the viability of the species and its habitat. Historic grazing at the level observed during 1994, on some populations, has resulted in habitat degradation, affected species health and vigor and probably loss of individual plants and/or clones. At least one population may be below viable population numbers. Some of the grazing systems currently in place do not offer adequate rest and protection. These populations appear to have low vigor, produce very little annual leader growth or catkin development. Currently the Forest Service is in the process of analyzing and reviewing the reissuance of grazing permits on all the National Forest administered lands.

Range Allotments

Dixie National Forest
Six Lakes Sheep Allotment

The CCC Camp, Long Valley, western portion of Power Line (95%), and Sheep Herder Arizona willow populations occur in this allotment. The National Monument fence along the western and northern part of the CCC Camp population, adjacent to the NF, provides

an artificial L- shaped inclosure for the herder to use the area as a holding/bedding ground. Over the years this has had significant impacts on the vegetation in the area. A distinct fence line contrast exists between the National Monument and NF administered lands. Arizona willow plants on the National Monument are very healthy, are in dense stands, and occur right to the fence boundary. Very few plants occur on adjacent NF lands. The Power Line population has not received any noticeable use by ungulates. The Sheep Herder population has had noticeable use on selected plants indicating a livestock preference for specific plants. Overall use on this population does not appear to be significant. Some of this use may result from holding sheep in the area to long. The herder does camp on the dry slope above the population for a period of time. A shift of camp areas may be a mitigating action needed to remove this impact.

This area has been used exclusively by sheep since southern Utah was settled in 1851. Records show that in 1911, there were 1279 sheep grazing the allotment from 6/16 to 10/31. Cattle were grazed in common with the sheep beginning in 1917. Prior to 1946, coop bands used the range and trading of allotments occurred frequently, from cattle to sheep and sheep to cattle.

Presently there are 1230 sheep using the allotment from 6/21 to 9/25. On the high elevation range where Arizona willow is located the sheep graze from approximately 7/10 to 9/1.

The upper units are grazed under a deferred-rotation system in which the two units are alternately used first. Normally, the grazing schedule is set for 25 days in each unit.

In 1984 when the allotment management plan was revised, it was estimated that range condition on the allotment was improving and 63% of the potential range was in fair condition and 37% in good condition. There are concerns about portions of the Long Valley unit where grazing has been excessive. Plant vigor is low and ground cover is lacking in certain areas to protect the soil. There is hedging of the Arizona willow on the Cedar Breaks south portion.

In the 1995 annual operating plan of use, the number of sheep band days will be reduced in the Long Valley unit to restore plant vigor. The unit will be grazed last to allow the plants to reach seed maturity. Those areas next to Cedar Breaks National Monument will be defined in the annual plan of use as areas with lighter grazing. Utilization cages will be installed to monitor use and see that these standards are met.

Dandelion Knoll Sheep Allotment

Arizona willow populations occur within Hancock Peak, and the eastern portion of Power Line (5%) population. No detectable grazing was observed on the East Power Line or Hancock Peak populations in 1994. Both populations have large healthy robust plants.

The allotment has been exclusively sheep grazing since the establishment of the Forest Service. For many years prior to 1935, the season of use on this allotment was 7/1 to 9/30 for about 1230 sheep. From 1935 to 1940 the season of use was 7/1 to 9/15 and the number was reduced to 995. Since 1940 the season has been adjusted several times to the present season of 7/11 to 8/20 for 1325 sheep months.Current status of the permit is 995 sheep for a 7/11 to 8/20 grazing season.

The allotment is divided into three grazing units; north, south and summit. These units will be used on a deferred-rotation system of grazing. The north and south units will be alternately used first each year. On approximately August 10, the sheep are moved to the summit unit.

Range conditions on the allotment are based on observations of the area during the last few years. According to the range analysis, 55% of the potential range is in fair condition and 45% in good condition. Range trend is estimated to be stable or up..

In the 1995 plan of use, there will be no special provisions for the Arizona willow in rainbow south population.

Brian Head Sheep Allotment

Within the Rainbow Meadows portion of this allotment, approximately 10% in the northern half contains Arizona willow. Sheep graze on the uplands above and adjacent to the Arizona willow stand and apparently do not use the wet areas where Arizona willow occurs. No use was observed on Arizona willows in 1994.

The allotment was used in common with sheep and cattle until 1920. From 1920 to 1926, the preference obligation was 1428 sheep for a season of 7/1 to 9/30. From 1926 to 1946 the preference was adjusted from 1428 sheep and a season of 7/1 to 9/30 to 800 sheep and a season of 7/16 to 9/15.

In 1983, the Brian Head and Haycock Mountain allotments were combined. Permitted number on the Brian Head allotment at that time was 750 sheep for a 7/16 to 9/15 grazing season. On the Haycock Mountain allotment permitted numbers were 817 sheep for a 6/11 to 9/30 grazing season. Between the two allotments permitted numbers were changed to 1000 sheep for a 6/11 to 9/30 grazing season. This resulted in a reduction of the total number of animal months by 828 sheep months.

Current status of the permit is 1000 sheep for a 6/11 to 9/20 grazing season. Brian Head will be grazed from 8/15 to 9/30.

The allotment is grazed under a modified deferred- rotation grazing system. The Haycock Mountain allotment is divided into 3 units, where the sheep graze for approximately 2 months at the beginning of the grazing season. On about August 10 each year, the sheep

are trailed to the Brian Head portion of the allotment. Therefore, Brian Head is deferred until after seed ripe each year.

Based on field observations on the allotment, range conditions have improved and trend is up or stable. It is estimated that 25% of the potential range is in good condition, 69% is in fair condition and 6% is in poor condition.

In the 1995 annual plan of use, there are no special provisions planned for the Arizona willow in the Rainbow north population.

Sidney Valley Cattle Allotment

All of the Lowder Creek population and 20% of the Sidney Valley population occur in the southern portion of the Sidney Valley cattle allotment. Moderate use has occurred on some plants in the Lowder Creek population,with some heavy use on a few selected plants along the outer population margins. Most of the use has been along the margins of the population where the plants are less dense and where cattle trail. This use has mostly occurred below the peat bog and appears to be on selected plants. Most of the plants are 4-6 feet tall in the core area with smaller individuals (1-3 feet high) along the margin of the habitat demonstrating some age class variation or growth response to grazing. Most of the livestock grazing occurs in the lower part of the population. Plants in this area are smaller in stature, are not present throughout the potential habitat area and appear to be less vigorous than those in the upper portion of the drainage.

This allotment was established from the Sidney Valley sheep allotment in 1949. The obligation was 60 cattle for a season of 7/11 to 9/10. This is the present obligation.

From 1920 to 1939 several changes were made in boundaries of this allotment. Some range lands were taken from the allotment about 1935 and added to the Dandelion Knoll Allotment. In 1939 a shift in sections of the allotment boundary was made in connection with creating exclusive range for cattle near Houston Mountain on the Asay Bench Allotment. Some range was added to the Red Desert Allotment.

On June 6, 1947, the Sidney Valley Sheep preference held by the Claude Smith Brothers was waived back to the government and the upper portion known as Upper Sidney Valley was then attached to the Warren sheep Allotment. The allotment was grazed by sheep until 1949. In 1978 the Lowder Creek land exchange were completed and 320 acres in Lowder Creek was added to the Sidney Valley Allotment. Only a small portion of this is potential range.

Current status of the permit is 60 cattle for a 7/11 to 9/20 grazing season.

The allotment is grazed as one unit under a season-long grazing system. Most of the grazing capacity is located in Sidney Valley and near Lowder Creek. Cattle are distributed

according to the available forage.Overall the allotment is considered to be in good condition. According to range analysis data, approximately 80% is classed in good condition and 20% in fair condition.

In the 1995 annual plan of use, the permittee will be informed of the willow population on his allotment and it's location. An evaluation will be made before the grazing season to determine the need for installing an electric fence for willow protection as was done last year in the Sidney Valley willow population. A 3 way experimental exclosure has been installed in Lowder Creek to monitor wildlife, livestock uses, an area open to all uses and total protection from all uses. Within Sidney Valley monitoring will occur within the areas where the electric fences have been installed.

Warren-Bunker Sheep Allotment

The Bunker Creek, Castle Creek, and northern part of Sidney Valley contain populations of Arizona willow. The Bunker Creek (1 acre) and Castle Creek (6 acres) populations have received light grazing. This portion of the Sidney Valley population has not been affected by grazing. Apparently sheep frequent the dry areas adjacent to the wet riparian willow habitat. Only light grazing was observed along the margin of the population in 1994.

From the creation of the Forest in 1905 to 1947, many small allotments were consolidated into the present Warren-Bunker allotment. In 1912, the season of use was 6/16 to 10/31. In 1919, there were 1852 sheep permitted on the allotment for a 6/16 to 9/30 grazing season and 65 cattle for a four month grazing season. In 1939, there were 1005 sheep grazing from 7/1 to 9/15. In 1947, upper Sidney Valley was added to the Warren sheep allotment. In 1970 there were 1122 sheep permitted for a 7/6 to 9/20 grazing season. In 1990 sheep numbers were reduced for range protection to 900 sheep.

Current status of the permit is 900 sheep for a 7/6 to 9/20 grazing season.

The allotment is grazed under a deferred-rotation grazing system. The system is designed to delay grazing in each unit until after flowering and seed ripe stage of some forage plants, every other year. Sheep will begin grazing one year in Bunker Creek and the next year in Mammoth Creek.

Range condition on the allotment is considered fair overall. A reduction in sheep numbers was made in 1990 to reduce the grazing impact and try to improve range condition. Trend studies have not been evaluated since that time.

There are no special provisions planned in the annual plan of use on this allotment to protect the Arizona willow in the upper Sidney Valley willow population.

Brian Head Summit sheep trail

Since the first sheep permits were established on the Cedar City Ranger District, sheep bands have trailed up over Mammoth Summit and around the north and east edge of Cedar Breaks National Monument to gain access to their grazing allotment. Presently, there are four bands that use this route twice a season. The Warren-Bunker band and Dandelion Knoll band trail to the east entrance of Cedar Breaks National Monument and then trail down the Panguitch Lake Highway. The Six Lakes and Sage valley bands trail south from the east entrance to Cedar Breaks through the corridor of National Forest land. This trail continues along the entire east boundary of Cedar Breaks.

Small populations of Arizona willow exist on the north edge of Cedar Breaks and the east side of Cedar Breaks. These populations are located in a narrow corridor of National Forest land where the sheep trail. This would be minimally affected in a normal year because sheep trail through the area but do not stop to graze.

The Brian Head Peak Arizona willow population occurs in the Haycock Mountain allotment. This populations occupies about 1 acre around a small spring. No grazing impacts have been observed on this population. The Brian Head Town population is in the Navajo Ridge allotment but occurs on private lands not currently grazed by livestock. The Cedar Breaks National Monument populations receive no livestock grazing. The Midway Face population (approximately 3 acres) is in the Sage Valley allotment. Very little, if any, grazing occurs on this population. The Navajo Lake area where Arizona willow occurs is in an unobligated area for grazing. The Reeds Valley population, in the Asay Bench allotment, has had light grazing use by cattle but is not a significant threat to the population.

Robinson Canyon Allotment

The East Fork of the Sevier population is the only know population of Arizona willow in this allotment and on the Powell Ranger District. The East Fork drainage has had a long history of heavy livestock grazing since the pioneers entered the area in the mid to late 1800's. Currently the water table is 2-6 feet below the normal historic level. As a result much of the riparian area has been converted to a dry meadow, sagebrush or rabbitbrush type with lower resource values for riparian dependent species than vegetation communities which have the potential to occupy these sites. Some large dead clumps of willow (probably geyer or booth) occur in these dry areas away from the current riparian area, which documents the riparian area was much broader at one time. Arizona willow was not located in many potential habitat areas searched in this drainage during 1994. If fully implemented, the Management objectives in the current Allotment Management Plan (5/16/94) can provide for restoration of these key riparian areas.

Current status of the permit is 88 cattle (cow/calf) for a 6/16 to 8/20 and 8/01 to 10/5 grazing season using a deferred-rotation grazing system. Two units, Robinson and

Blubber, are grazed annually, with alternating dates of use. An Annual Operating Plan will be developed to prescribe management activities needed for each grazing season. Until range readiness is reached each year, no livestock will be allowed on the allotment.

Fishlake National Forest
Seven Mile Drainage

The Seven Mile population of Arizona willow is the only known population on the Fishlake NF based on surveys completed in 1994.

The Seven Mile Allotment Management Plan (AMP) was updated in 1986 to meet three primary management objectives: 1) maintain range, ecological and soil condition at fair or better condition with stable or upward trends, 2) improve overall stream habitat condition at or above 70% optimum by 1993, and 3) firm grazing capacity by 1989 and stock to that level.

Grazing utilization in 1994 ranged from 60% to 90% of total forage on both the riparian and uplands (Atwood and Winward pers. comm. 1994). Production potential in the uplands is estimated to be 2,500 pounds of forage per acre. Actual production is estimated to be 900 pounds per acre with 90% of the species present being non-desirable (Atwood Winward personal communication 1994). Thus, desirable annual production is about 90 pounds per acre. Range analysis data collected in 1994 showed the ecological status for the uplands to be in very early and early seral stages. A substantial amount of small mammal activity occurs in the area. Preliminary data indicate some riparian areas are in an early to mid seral stage. The desired future condition would be a mix of all four seral stages represented throughout the drainage.

Historical grazing and fire suppression in this drainage have substantially altered the historical fire patterns reducing the available forage throughout the drainage and placing increased pressure on the remaining forage.

The management prescription identified in the AMP is a deferred rotation system on the summer range where Arizona willow occurs. However, in the 1994 grazing season, 1144 cattle (cow/calf) used the entire Seven Mile drainage area for a 6/29 to 9/2. Herders moved the cattle away from the riparian areas to reduce concentration of cattle in these sensitive areas. The existing AMP is currently undergoing a revision and National Environmental Policy Act (NEPA) review. This process will be completed by the beginning of the 1995 grazing season.

Cedar Breaks National Monument

The Cedar Breaks National Monument (NM) populations, of Arizona willow, occur along the northeast boundary of the monument across from Sunset View. This area is currently grazed by wildlife with no historical records of livestock grazing, other than horses. It is

however very likely that the area was grazed by other species of livestock during the early settlement period of southern Utah. Historically, the area east of Sunset view was used as a Civilian Conservation Camp (CCC). This area contains the largest population of Arizona in the NM. The population within the NM is in good condition and consists of large healthy plants on the western portion in the drier sites and the more dwarf form on the wetter anaerobic sites.

B. Wildlife Grazing

Ungulate Herbivory

Mule deer, Rocky Mountain elk, moose, and pronghorn antelope are the large wild ungulates found within Arizona willow habitat in Utah. Other species which may use, or effect, Arizona willow populations include beaver, and a variety of small animals.

All 19 populations on the Dixie NF occur within occupied mule deer and elk habitat. In addition, the East Fork of the Sevier population occurs within occupied pronghorn antelope habitat. There have been no recorded sightings of moose inhabiting the Dixie NF. The Seven Mile population provides habitat for Rocky Mountain elk, moose, deer, and a variety of small mammals.

Preliminary data collected by research graduate students and field observations by agency personal indicate that little grazing occurs on Arizona willow. Elk numbers are in stable condition and are all within established population herd objectives as stated in approved elk management plans.

Rodent Herbivory

Two of the 20 Arizona willow populations in Utah have recorded beaver activity. The overall extent to which rodent herbivory, in Utah, affects Arizona willow is unknown. Brigham Young University, and agency professionals, will be recording field observations on any use by rodents, especially over the next three years. Herbivory threats by beaver are not a significant impact on Arizona willow since both the Dixie and Fishlake NFs have sufficient quantities of aspen adjacent to willow stands. Very few beaver currently occur in Arizona willow stands in Utah. Aspen is the preferred forage over willow, but in the absence of aspen utilization of willow could be a significant threat. preferred over willows). Beaver dams can potentially inundate or partially submerge Arizona willow plants which may result in mortality of plants. Because Arizona willow plants are in such abundance distributed along given drainages, it is unlikely that a beaver dam could kill the majority of plants located on a drainage, because the water table has been lowered on the East Fork population , due to habitat degradation, beaver dams could probably increase the water table creating more potential habitat for Arizona willow, providing proper Arizona willow habitat conditions are created by these dams.

This would also be the case in other rodent herbivory. Caution against using small cages as a management tool should be mentioned because it has been known to cause additional mortality on caged plants.

C. Recreation

Little information is known about the threats to the Utah populations of Arizona willow from recreationalists. Probably the greatest threat will come from off-highway vehicle (OHV) users. Riding OHV's into areas to fish is quite popular on the high plateaus of Utah. Where fisheries are good to excellent, which is the case with some of the Utah populations, portions of the stream banks are edged with well beaten paths from OHV use. These paths are devoid of vegetation due to trampling and soil compaction. In addition, these areas of trampling and soil compaction often extend to the water at many places which offer a promising fishing spot. Continued OHV use and soil compaction may seriously threaten the habitats for the Arizona willow in addition to damaging or killing established plants. Also, general use of OHVs during snow-free periods and early-winter snowmobiling have damaged some Arizona willow habitat in the Utah populations. This is occurring in the East Fork of the Sevier River population and other potential areas along the drainage.

Some areas where the willow has been found are popular sites for dispersed camping. At times, tents are located near individual plants of Arizona willow and small latrines and camp refuse are occasionally scattered among the plants. This is not common, but the situation does occur. Recreational wildlife viewing, nature photography and general sight-seeing are not thought to present serious threats to the populations of Arizona willow in Utah.

A closure order will be issued by the Forest Supervisor in 1995 to mitigate dispersed recreation impacts to Arizona willow in the East Fork of the Sevier drainage. Impacts from recreation activities in the other known populations of Arizona willow in Utah are minimal and do not pose a significant threat to the species or its habitat.

D. Construction of Roads and Trails

Threats from roads may be slight for most of the Utah populations of Arizona willow. However, the distinct possibility of a threat from proposed changes in the location of the existing road does occur in the Seven Mile Creek drainage on the Fishlake NF. The Federal Highway Administration has been notified of the existence of Arizona willow within the road corridor of the proposed road realignment.

The Environmental Assessment being prepared by the Federal Highway Administration will address, and provide mitigation measures to protect the Arizona willow in these drainages.

Developed trails do not bisect any of the existing 20 populations in Utah. Trail networks should not be encouraged or planned through known populations of Arizona willow.

E. Timber Harvest

Timber harvesting may effect Arizona willow plants by indirectly increasing siltation in streams and changing overland flows due to the lack of available trees to draw moisture. In addition, skid trails and temporary roads remaining open, in conjunction with, the lack of existing and future woody debris would contribute to stream siltation. Increases in siltation and overland flows may be a results of overstory thinning, skidding, slash piling, and road construction. Increasing stream sediments may affect Arizona willow plant recruitment by decreasing the sites available for germination. High organic loads may contribute to rotting seedlings, thereby decreasing their survival. The same result would occur if numerous trees were logged or removed from the landscape and overland flows increase. With these increased flows sediment loads would increase.

Mitigation for the above potential impacts will be addressed during the NEPA process, especially through in the biological evaluation process for sensitive species.

F. Insect and Disease

The incidence of disease and insect damage in the 20 Utah populations, has not been determined. Specific data will be gathered as a part of inventory and monitoring research scheduled for completion over the next few years. This information has been gathered by researchers and specialists for several years from populations of the willow in Arizona. Maschinski (1993) and Fairweather (1993) summarize what is known about diseases for Arizona populations of Salix arizonica. Some of the key points from their papers are outlined below which support the hypothesis that Utah populations may not have similar disease infestations.

A rust fungi in the genus *Melampsora* infects some Arizona willow plants. Identification of the species in this genus is difficult and has not been determined. This rust has a complex life cycle that may include up to five spore stages some of which must be completed on an alternate host. Some rusts have alternate host species in the gooseberry family (genus *Ribes*), but the alternate host for this rust remains unknown. The extent of the infections and the amount of damage caused varies from plant to plant and is probably related to genetic characteristics of individual clones. This rust affects plant growth and vigor in at least two ways: early leaf drop of infected leaves reduces the photosynthetic potential and stem die back results in the loss of flower buds. The best way to manage for reduced levels of rust infestation is to maximize the genetic diversity and sexual recombination in the population which allows the continual development of resistant clones in the populations. In other words, allow ample opportunity for the continual establishment of new seedlings. Individual plants infected with rust have been observed in Utah, but initial observations suggest that the 20 Utah populations have substantially

lower rates of rust infestation than the populations in Arizona. It is unknown if Arizona willow is infected by any other diseases.

Even less information is known about the threats to the Arizona willow from insects. The brief details below come from Maschinski (1993), which pertain to populations in Arizona, with the assumption that similar insect/willow relationships probably occur in the Utah populations. Reductions in seasonal and long-term plant growth occur when insects substantially defoliate their host plants. Field observations confirm the complete defoliation of some individual Arizona willow plants by mourning cloak butterfly larvae (*Nymphalis antiopa*). There are no other reports of insect damage to the willow in Arizona. For the Utah populations of the Arizona willow, there have not been any field reports of defoliation. Insect galls occur on several Utah populations of Arizona willow.

G. Urbanization and Development of Private Property

Within the boundaries of the Dixie NF, many of these small blocks are in the form of small ranches or subdivided units for cabins.

Arizona willow occurs on 2 sites which are located on or directly adjacent to private property. Both sites have numerous acres of Arizona willow with many thousands of plants. Urbanization, or development of these sites may destroy individual plants and impact populations. As these areas are developed, new roads and trails would be built. Within these areas, recreational use would also increase, which could also impact individual plants and/or populations.

Within the Seven Mile population on the Fishlake NF, one private block of land exists within occupied habitat. Arizona willow is scattered throughout this private block, however development of this site is unlikely due to the marshy condition.

H. Natural Competition

Information is scarce about the threats to Arizona willow from natural competition in the 20 Utah populations. Since this species grows in riparian habitats, it is doubtful that either water or nutrients are limiting resources in most habitats. The most likely resources that may limit the survival and success of this willow are probably the lack of bare mineral soil and light. This willow grows in the spruce-fir zone but not in direct association with these conifers. Spruce (*Picea* spp.) and subalpine fir (*Abies lasiocarpa*) limit the light available to understory species. Conifers do have high water demands and do tend to make sites drier. also, conifer sites typically have a lower pH. More information is needed, but these are possible reasons why Arizona willow does not thrive under conifers.

The lack of bare ground limits the success of Arizona willow because of insufficient suitable mineral-soil microsites for seedling establishment. At least three grass or grasslike species, which are common in the Utah populations, form dense mats and have vigorous

root development from spreading rhizomes. This ability to form dense mats allows these species to effectively cover the exposed bare, mineral-soil substrate where new seedlings of Arizona willow might establish. The three species are water sedge (*Carex aquatilis*), Baltic rush (*Juncus balticus*), and Kentucky bluegrass (*Poa pratensis*).

Maschinski (1993) presents details about the negative impacts of Kentucky bluegrass, an exotic, aggressive sod-forming species in riparian areas. Kentucky bluegrass tolerates grazing and often replaces native bunch grasses. Changes in species composition in some of the Arizona willow habitats may adversely affect the willow. Collection of additional data about natural competition will be a focus of the monitoring effects for the Utah populations.

Emphasis over the next decade with be on use of native plant species for revegetation and restoration projects. Emphasis will also be placed on a reduction of exotic species and noxious plant species.

V. POPULATION NARRATIVES

Following are detailed descriptions of each Arizona willow population in Utah. The location, current conditions, and management actions are included, as well as planned conservation actions for each site.

Population Name: Brian Head Peak

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T.36 S., R. 9 W., S.14. This population is located 15.5 miles south of Parowan, Utah on Highway 143, 0.4 miles west of the Brian Head Peak view site road. (FR 047)

Habitat Size: 1 acre

Narrative description of population and existing conditions: The plants in this population are healthy and range in size from 6 to 36 inches with little to no signs of herbivory. These plants are growing on the south side of Brian Head Peak surrounding a small seep. Domestic sheep graze this area, but no use was observed.

Grazing Allotment(s): Brian Head (sheep)

Livestock Management Unit: Brian Head Peak

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Little to no herbivory was observed during field monitoring. Recreational trail development in the Brian Head Peak area is expanding and could potentially be a concern.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None Currently Planned.

Population Name: Brian Head Town

Land Ownership: Private Town of Brian Head

Location: T. 36 S., R. 9 W., S. 2, 10, & 11. This population is located 13.5 miles south of Parowan, Utah on Highway 143 near the town of Brian Head, in Bear Flat across from Chair 2.

Habitat Size: 20 acres

Narrative description of population and existing conditions: The plants in this population are all healthy and vary in size from 6 to 36 inches in height. There were no signs of herbivory within this site. Impacts from human activities as a result of ski area development were not observed.

Grazing Allotment(s): Navajo Ridge Cattle

Livestock Management Unit: Navajo Ridge

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: The primary concern in this area is the development at Brian Head Ski Resort.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: Sample for DNA analysis.

Population Name: Bunker Creek

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: This population is located 1 mile south of the Panguitch Lake Campground off Highway 143, approximately 5 miles west on the Bunker Creek road.

Habitat Size: 1 acre

Narrative description of population and existing conditions: This cluster of plants is located along Bunker Creek. Cattle herbivory is evident along this riparian corridor with minimal signs of use on individual plants.

Grazing Allotment(s): Warren/Bunker (sheep)

Livestock Management Unit: Warren/Bunker

Elk Herd Unit: Panquitch Lake

Site Specific Concerns: The primary concern in this area is recreational development, future timber harvesting and cell associated practices.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: Sample for DNA analysis.

Population Name: CCC Camp

Land Ownership: Cedar Breaks National Monument and
Cedar City Ranger District, Dixie National Forest

Location: T. 36 S., R. 9 W., S. 36., and T. 37 S., R. 9 W., S 1, 12. This population is located 3.5 miles north of the Cedar Breaks National Monument lodge on Highway 143. This site is located where the old CCC camp was situated.

Habitat Size: 42 acres

Narrative description of population and existing conditions: The plants in this population are scattered along the boundary of Cedar Breaks National Monument and the Dixie National Forest. Plants have been stunted due to sheep trampling, bedding and grazing. This corner of the National Forest is a popular bedding and holding area for sheep. Past use from activities related to the old CCC camp also affected this population by stunting growth and individual plant mortality.

Grazing Allotment(s): Six Lakes

Livestock Management Unit: Long Valley

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: The greatest concern in this area is the continued use by sheep as a bedding and holding area.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: Sample for DNA analysis.

Population Name: Castle Creek

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S16,17. This population is located 1.5 miles up the Sidney Valley Road (Forest Road 048) on the northeast side down Castle Creek approximately 300 yards.

Habitat Size: 6 acres

Narrative description of population and existing conditions: This population is located near Castle Creek at the south end of Sidney Valley. Plants range in size from 6 to 20 inches in height and are scattered throughout the riparian area which extends downstream approximately 0.5 miles. Plants have been grazed by cattle and possibly elk.

Grazing Allotment(s): Sidney Valley (cattle)

Livestock Management Unit: Sidney Valley

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Cattle grazing is a concern and elk if populations increase.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: Sample for DNA analysis.

Population Name: Cedar Breaks

Land Ownership: Cedar Breaks National Monument

Location: T36S, R9W, S25. This population is located within Cedar Breaks National Monument, 0.75 miles south of the Panguitch Lake Junction with Highway 143 on the east side of the road. It can be observed from Highway 143 along the forested edge.

Habitat Size: 1 acre

Narrative description of population and existing conditions: This cluster of plants is protected from all livestock grazing. Wildlife herbivory is minimal, if any. Plants range in size from 6 to 36 inches in height. This population is situated directly above the larger Powerline population approximately 200 yards.

Grazing Allotment(s): None--NPS

Livestock Management Unit: None--NPS

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: No concerns have been identified.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None programmed.

Population Name: Crystal Springs

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T. 37 S., R 9 W., S. 8. This population is located 15 miles east of Cedar City, Utah off Highway 14, approximately 1 mile north off Forest Road 301. These plants are enclosed within a pole fence which surrounds Crystal Springs.

Habitat Size: 1 acre

Narrative description of population and existing conditions: This population is a healthy, isolated population near the Ashdown Gorge Wilderness Area. Plants are located within the fenced spring area. Although the fence needs to be repaired, grazing has had little impact to individual plants.

Grazing Allotment(s): Cedar Canyon (sheep)

Livestock Management Unit: Cedar Canyon

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area are from sheep grazing and trampling to get to the water source.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: Sample for DNA analysis.

Population Name: East Fork of Sevier

Land Ownership: Powell Ranger District, Dixie National Forest

Location: T39S, R4.5W, S10. This population is located 17 miles south of Tropic Reservoir off Forest Road 087, adjacent to the Robinson Canyon (Forest Road 087) East Fork (Forest Road 209) junction, along the East Fork of Sevier River.

Habitat Size: 2 acres

Narrative description of population and existing conditions: This population lies within a highly degraded section of the East Fork of the Sevier. There are 14 plants in this population ranging in size from 24 to 36 inches in height. These plants all show signs of moderate cattle grazing. Because these plants are located above and below a small beaver dam. Beaver damage could occur.

Grazing Allotment(s): Robinson Canyon Cattle

Livestock Management Unit: Robinson Canyon

Elk Herd Unit: Paunsaugunt

Site Specific Concerns: Concerns in this area are from cattle grazing, possibly beaver herbivory and recreational uses especially ORVs.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona. See tables, Parts I and III for further details on monitoring and research activities. Initiate research to explore seedling establishment and viability and vegetative propagation..

Population Name: East Power Line

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8.5W, S3. This population is located approximately 0.5 miles from the junction of Highway 143 and the Panguitch Lake Highway on the southwest side of the road approximately 500 yards off Highway 143.

Habitat Size: 37 acres

Narrative description of population and existing conditions: This healthy population is located east of the Power Line population which is the third largest known population. Plants are large in stature and range in size from 3 to 36 inches in height. Sheep graze this area during summer months but little or no evidence of use occurs.

Grazing Allotment(s): Dandelion Knoll Sheep

Livestock Management Unit: Dandelion Knoll

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Road development to access private land

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None Programmed

Population Name: Hancock Peak

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S29. This population is located 4 miles northeast of the junction of Highway 143 and the Panguitch Lake highway approximately 0.4 miles off the highway to the east toward Hancock Peak.

Habitat Size: 24 acres

Narrative description of population and existing conditions: This healthy population occurs along the banks of the upper reaches of Mammoth Creek. These plants range in size between 24 to 60 inches in height. These are some of the largest plants in Utah. Some of the Arizona willow branches that overhang the stream have been damaged due to high spring/summer runoff flows or frost.

Grazing Allotment(s): Dandelion Knoll Sheep

Livestock Management Unit: Dandelion Knoll Sheep

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: None

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None Programmed

Population Name: Long Valley

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T37S, R8.5W, S14,24. This population is located 2 miles east of the junction of Highway 143 (to Cedar Breaks) off Highway 14. Go east on Highway 14 and turn left (north) on Forest Road 039 to Long Valley. These plants area located along Long Valley Creek in 6 clusters.
Habitat Size: 4 acres

Narrative description of population and existing conditions: This population consists of 6 clusters of plants. They are all found along Long Valley Creek near the stream. Plant heights vary in size from 6 to 24 inches. All 6 clusters are healthy but scattered.

Grazing Allotment(s): Six Lakes Sheep

Livestock Management Unit: Long Valley

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area are minimal; however, recreational use, if increased could be a problem.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None Programmed.

Population Name: Lowder Creek

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S19,20. This population is located 2 miles north of the Panguitch Lake Highway off Forest Road 041. The population starts at Lowder Pond and extends down Lowder Creek to the east.

Habitat Size: 142 acres

Narrative description of population and existing conditions: This healthy population is the second largest population known. Plants range in size from 6 to 80 inches in height. These plants area healthy and very dense in the drainage bottom. Some moderate grazing was observed by cattle.

Grazing Allotment(s): Sidney Valley Cattle

Livestock Management Unit: Lowder Pond

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area are from cattle grazing and recreation.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona. See tables, Parts I and III for further details on monitoring and research activities.

Population Name: Midway Face

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T37S, R8.5W, S26. This population is located 1.2 miles east of the junction of Highways 14 and 143 on the south side of the Highway 14. This cluster of plants is along the forested edge of the meadow in a wet seep area.

Habitat Size: 3 acres

Narrative description of population and existing conditions: This population is a small cluster of plants located in a wet area along the forested edge of the meadow. Plant heights range from 6 to 20 inches. Little to no grazing use was observed in this area.

Grazing Allotment(s): Sage Valley / Horse Valley Sheep

Livestock Management Unit: Sage Valley

Elk Herd Unit: Cedar Mountain

Site Specific Concerns: Concerns in this area are related to future timber harvesting or thinning.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona.

Population Name: Navajo Lake

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T38S, R9W, S12. This population is located along the northwest end of Navajo Lake in the marshy area..

Habitat Size: 9 acres

Narrative description of population and existing conditions: This population is a healthy, dense cluster of plants located at the northwest end of the lake. The health and vigor of this population could be determined by the water table associated with Navajo Lake. Plant heights range in size from 6 to 36 inches.

Grazing Allotment(s): None

Livestock Management Unit: None

Elk Herd Unit: Cedar Mountain

Site Specific Concerns: Concerns in this area included water table fluctuations and recreation use.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona.

Population Name: Power Line

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R9W, S24,25. This population is located approximately 0.5 miles from the junction of Highway 143 and the Panguitch Lake Highway on the southwest side of the road approximately 300 yards off the Panguitch Lake Highway.

Habitat Size: 105 acres

Narrative description of population and existing conditions: This is a very large healthy population that is scattered on National Forest and private land. Plants in this population range in height from 6 to 48 inches. This population is almost a pure stand of Arizona willow. During the development of the power line corridor, a swath was cut directly through the northern portion of this stand. Arizona willow plants have resprouted within this disturbed area.

Grazing Allotment(s): Six Lakes Sheep

Livestock Management Unit: Six Lakes

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Road development to access private land.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona.

Population Name: Rainbow Meadows

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S13,19,20,24,30. This population is located in the headwaters of Mammoth Creek approximately 2 miles southeast of the town of Brian Head, 0.5 miles east of Brian Head Peak Road (Forest Road 047) down Rainbow Valley.

Habitat Size: 304 acres

Narrative description of population and existing conditions: This population is the largest known population in existence. Plants are healthy throughout the drainage and grow on a variety of site conditions. Plants can be found within a somewhat closed forested canopy and on open, dry, south-facing slopes. Plants range in height from 3 to 48 inches.

Grazing Allotment(s): Brian Head / Dandelion Knoll

Livestock Management Unit: Primarily in Dandelion Knoll (south of Mammoth Creek drainage)

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area include timber harvest, road and trail construction, recreational use and private land development.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona.

Population Name: Reed's Valley

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T37S, R8W, S2. This population is located 5 miles south of the Panguitch Lake Highway, 3.3 miles on Forest Road 051 then east on Forest Road 196 near Red Valley ponds.

Habitat Size: 1 acre

Narrative description of population and existing conditions: This small cluster of plants is located near the Red Valley ponds. Plants show signs of moderate cattle use. Plant heights range in size from 6 to 20 inches.

Grazing Allotment(s): Asay Bench Cattle

Livestock Management Unit: Asay Bench

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area are from cattle grazing.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: None Programmed.

Population Name: Seven Mile Creek

Land Ownership: Loa Ranger District, Fishlake National Forest

Location: This population is about six miles NNE of Fishlake along both sides of Seven Mile Creek and in the adjacent meadows. Access this area by driving north one mile from the junction of State Road 25 and Forest Route 640 at Johnson Valley Reservoir.
UTM coordinates are 441400 E, 4276100 N; 443300 E, 4276100 N; 443300 E, 4280500 N; and 441400 E, 4280500 N.

Habitat Size: 151 acres

Narrative description of population and existing conditions: This population represents the northern most extension of the species' known distribution and extends the range by more than 100 miles. Plants occur along the stream and throughout much of the wide meadow. A few of the individuals are 20 to 30 (40) inches tall, but heights for most of the plants range from 4 to 12 inches. Historically, grazing pressure in this area has been heavy.

Grazing Allotment: Seven Mile Creek Allotment

Livestock Management Unit: Seven Mile

Elk Herd Unit: Fishlake Unit

Site Specific Concerns: The primary concern in this area is livestock herbivory.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See Table.

Research: This population should be included in a larger DNA study across Utah and Arizona. See tables, Parts I and III for further details on monitoring and research activities. Initiate research to explore seedling establishment and viability and vegetative propagation.

Population Name: Sheep Herder Camp

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S31. This population is located 1.5 miles south of the junction of Highway 143 and Panguitch Lake Highway on the east side of Highway 143. A small unimproved dirt road leading to an old cabin site goes directly to this site. This small dirt road is approximately 1.2 miles to the cabin.

Habitat Size: 72 acres

Narrative description of population and existing conditions: This is a large, healthy population that is almost a pure stand of Arizona willow. Plants in this population range in height from 6 to 48 inches. Plants in the north end of the population are very large and dense, as opposed to the south end, where plants are small and appear to have been damaged by frost. Scattered signs of sheep grazing are evident, primarily due to the area being used as a bedding area for sheep. The cabin site is a popular camping area for the sheep herder and some grazing impacts from sheep and horses are evident.

Grazing Allotment(s): Six Lakes Sheep

Livestock Management Unit: Six Lakes

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in this area are from the area being used as a sheep bedding ground and horse pasture for the sheep herder.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona. See tables, Parts I and III for further details on monitoring and research activities.

Population Name: Sidney Valley

Land Ownership: Cedar City Ranger District, Dixie National Forest

Location: T36S, R8W, S7,8,16,17. This population is located 2 miles up the Sidney Valley road (Forest Road 048) on the south side of the road in the large open meadow. This population is in the large open meadow and located along the banks of Castle Creek.

Habitat Size: 79 acres

Narrative description of population and existing conditions: This population is split between a cattle and sheep allotment. Plant stature within these two sites varies. On the cattle allotment side, heights range from 3 to 18 inches and from 3 to 24 inches on the sheep side. Moderate to heavy grazing occurs on the cattle allotment portion, and little to no grazing is evident on the sheep allotment side. Some elk use was observed within the two small upper meadow areas. This area is extremely wet and conditions likely affect plant stature and vigor.

Grazing Allotment(s): Sidney Valley Cattle / Warren Bunker Sheep

Livestock Management Unit: Sidney Valley Cattle / Warren Bunker Sheep

Elk Herd Unit: Panguitch Lake

Site Specific Concerns: Concerns in the area are from cattle grazing, recreational use, water table conditions and elk if populations increase.

Current Conservation Actions: See tables, Parts I and III.

Proposed Conservation Actions: See tables, Parts I and III.

Monitoring: See tables, Parts I and III.

Research: This population should be included in a larger DNA study across Utah and Arizona.